# BIO-DYNAMICS

*A periodical furthering soil conservation and increased fertility in order to improve nutrition and health.*

## SUMMER 1955


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The annual Conference and Meeting of the Bio-Dynamic Farming and Gardening Association, Inc., will be held at Threefold Farm, Spring Valley, N. Y., on July 29th, 30th and 31st. For reservations, address Mrs. Richard Kroth at this address and enclose $5.00 deposit.

The program will include three lectures by Dr. E. Pfeiffer. On Friday, the 29th, he will speak on the subject of *Roots*, on Saturday his topic will be *The Science of Composting*. His lecture on Sunday the 31st will concern the question, *Can Present Farming Survive in Our Economy?*

There will be other lectures and discussions, and opportunity for presentation of farm and garden questions by those present.

* * *

A Bio-Dynamic FARM Conference, concerned particularly with the problems of farmers rather than gardeners or small holders, will be held on the third week-end of September, at Golden Acres Farm, Newtown, Penna. For reservations write the B. D. Association, R. R. 1, Chester, N. Y.

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## THE CHANGING RURAL PATTERN—A CHALLENGE. II

E. PFEIFFER

The question of the survival of peasant farming is an important one. In our last article (Bio-Dynamics, Number 36) we discussed the fact that increased industrialization, and economic trends, make the farmer more and more into a kind of "growth mechanic". In recent years it has become increasingly difficult, especially for the small farmer, to stay in business at all.

Europe was, for centuries, a stronghold of peasant farming. There, small farmers were in the majority, especially in Southern and Middle Germany, Switzerland, France, Holland, Austria and the countries now behind the Iron Curtain. The farmer connected a certain "calling" with his profession, and he was able to do well on some 16 acres in mountain regions, or 36 to 60 acres of more level land on the plain. Hundred acre farms were already large units in their estimation, and the smaller farms gave a living to two, three and sometimes more people.

A recent visit abroad has convinced me that Western Europe is more and more on the way to the industrialization of agriculture. Also, the visitor encountered some surprises. First he was told of dust storms, and a dangerous loss of the ground water level, in the Rhine Valley between Basel and Frankfurt. Compared with the dimensions of the American prairie belt, this is only a small plain, but on its lighter soils with gravelly subsoil, there *have* been dust storms, and they are increasing.

On the adjoining hillsides, former vinyards had become unproductive, and been plowed up to be used as tilled land. Erosion was starting in many places. Thus it is no longer necessary for the South German farmer to travel to the United States in order to see dust storms and erosion.

Horse-drawn equipment has been replaced by tractors on many farms. Up and downhill plowing with the heavy tractors was the order of the day. The benefits of contour plowing were not as yet made use of. The present situation is a sad sight compared with some 20 years ago. The warnings expressed by the writer at that time in his books, "Soil Fertility and Preservation" and "The Earth's Face and Human Destiny", have been neglected.

What impressed us particularly in this trip was the heaviness and size of the tractors, which bore no relationship to the lay of the land and the size of the farm. The new tractors over

there are copies of American machines, such as the International H and M, Allis Chalmers, etc., but although used in the small farms referred to, they are the size of an International M, or Chase. One man rides the tractor, two sit on the fenders, and so they go out to the fields. These, ranging from half an acre to 2 acres in size, are scattered checkerboard fashion over the entire village area. More time is used up in getting to the widely dispersed plots than in working them.

The introduction of these heavy machines into that landscape was like a caricature of our farming. Equipment suitable for the cultivation of small acreage has not been developed there. The manufacturer has not yet gone into the problem of developing appropriate, small equipment — at least not to any visible extent. The farmer has to buy what he can get. There are, however, many new gadgets to be seen at the agricultural exhibits. People abroad are quite inventive. But the accomplishments in this regard are still in the "gadget" state, and it is left to the customer to prove their value.

Holland shows the most impressive recovery from war conditions, which in her case were largely synonymous with floods. Here the farmer has maintained himself because of his conservatism. Yet here too, the machine age has begun to invade farming. It is a peculiar situation that in a country where there is a distinct over-population and shortage of land, the shortage of farm labor is as evident as it is. Labor saving devices are being increasingly introduced. But nature, at the same time, insists on her rights — the recovery from the devastating floods still demands a lot of hand labor.

In a certain way farming was already a "business" in Holland even before the war, with little economic ideology, but very practical in its approach. In Central Europe one may observe a kind of split into two groups. One, the majority, thinks only in terms of business, of time and money. The others, definitely a minority, approach their activities in terms of maintaining the peasant farmer's attitude of carrying on and developing a rural culture. The situation is complicated by the fact that many, including some of the best, farmers — originating from small farms and from large ones — have been driven away from behind the Iron Curtain and are now trying to get new land in an already overcrowded situation. So one meets men who, in the East, had handled large estates and are now forced to settle as small holders. Nothing is more illus-

trative of the whole political nonsense than this. One simply cannot understand why a country, for political reasons, lets its best and most successful farm operators go simply in order to maintain its collectivistic ideology. These Iron Curtain countries suffer from starvation, as we have been personally informed by many people.

In Russia it was the peasant farmer who resisted longest the collectivist ideology. One wonders to what extent, today, the Russian peasantry still survives. Refugees assure one that despite the pressure to which the Russian farmer has been subjected, the old spirit of peasantry still lives. An interesting symptom was reported to us from a very reliable source; that one of the first things refugee farmers asked for was to have a Bible to read again. This was true even of the younger generation. We cannot say, one should *base hope* on a fact like this. But we ought to admire the Russian peasant farmer for his desperate struggle to survive. And we should begin to realize that true peasantry, in the real meaning of the word, (as distinguished from any kind of serfdom) is the strongest bulwark against communism, even in the West, even in a highly mechanized agriculture. The point is that any industrial, rationalized, step in farming has to be undertaken in such a way that the *calling of the farmer*, the peasant style farmer, is fostered and not destroyed.

The problem of China in this regard is extremely interesting. There collectivization, according to Russian example and instruction, is also on the march. China's problem for many centuries has been that there is too little land for too many people. It is said that the Chinese Revolution was due in large part to the rebellion of the small holders against exploitation on the part of large landowners. Mao (1947) published figures according to which 8% of the rural families owned from 70 to 80% of all the land before the revolution. It was, he continues, therefore necessary to equalize this "injustice" of land distribution and give more land to the poor peasantry.

But what has happened? In one province, Kwantung, the average "large" farmer holds 0.22 acre and the "small" farmer 0.17. This is below subsistence levels. One acre farms used to be the rule all over the East before the war and revolution.

In the same province, in order to create space for the "small" holders, some 500,000 "large" farm owners were executed and the newly available land distributed. This distribu-

tion was declared complete by April, 1953. These tiny acreages are not operable by any method. With a few exceptions, such as on the Manchurian plains, the country does not lend itself to a Russian-style collectivization. And since there are already too many people for too little land there is no need for extreme mechanization. This, by the way, was the error of Madame Chiang Kai-shek, who, before the war, wrote to the author of this article that she saw the salvation of the Chinese farmer only in American-style mechanization.

In April, 1953, there began a flight from the land into the cities. The two cities of Mukden and Fushan alone received more than 20,000 farmers, "because of lack of food in the country". Why being in the city should help them to get more food is not understandable, except that they then became members of the proletariat and were to be fed by the state. The regime, of course, denounced all the remaining farmers for their obstinacy in not producing enough food — a text which can be read frequently in Russian papers.

We take the above, revealing data from an interesting article by Richard L. Walker, "Collectivization in China", in *Problems of Communism*, published in Washington in January of this year. The article says in conclusion that it may be mentioned that Mao decided to force collectivization and the erection of a State Food Monopoly only after the Soviets in mid-September, 1953, in the course of negotiation of a Soviet-Chinese Treaty, consented to the delivery of industrial equipment in exchange for Chinese export goods (meaning the much-needed food). The increase of food supply exports that followed, and the propaganda addressed to the population as to the need of delivering food to China's brother-nation permits the conclusion that the Soviets helped toward the decisions arrived at in China. If, as Stalin himself conceded, the Soviet collectivization cost ten million human lives, it is understandable that the Chinese leadership should be no less "magnanimous" in this regard.

All that we here can do is voice deep sorrow for the sufferings of the Chinese, and note the passing of peasant farming in China.

The whole situation imposes a great responsibility on Western civilization. The day dreaming (and we do not mean this at all in a deprecatory sense) of a rural "peasant" society, links itself increasingly with the idea of "collectives" and is restricted

to those no longer connected with the land themselves. They find refuge in an ideology.

At the same time we see the farmers of today caught in a tight squeeze of circumstances. For many people, there is not enough food. There is, we are told, and some evidence seems to bear it out, over-production of wheat, milk and other products in other parts of the world (in this country for instance). There is, without question, wrong distribution. This, for economic reasons in some cases, political reasons in others, cannot be set right.

There are other problems which are of the very greatest concern to the farmer: problems which have not been conquered despite all the efforts of science and of governments. For instance, fertilizer consumption in the U. S. A. has increased 350% over the last 15 years while the average acreage yield per acre has increased by only 30% as compared with the preceding 20 year period. This fact can be interpreted in many ways. The open minded farmer, however, is justified in reading it to mean that the increased effort and expense has not borne enough fruit. So too there is the continuing increase of insect pests and crop spoilage, accompanying the ever increasing use of insecticides, dusts and sprays. Then there are the dust storms. While we had thought that these conditions had been overcome by the efforts of the New Deal period and the work of the Soil Conservation Service, we read that this spring the dust storms were worse than ever.

There is also, in Europe at least, the menace of livestock diseases. I personally burned my fingers in 1950 by mentioning the high rate of tuberculosis in livestock. In some countries this situation has improved in the past five years. But on the average the incidence is still 25%. There is the menace of Bangs Disease (brucellosis), sterility and related diseases which in some European countries we found to be still high and even on the increase. Mechanization and rationalization have not brought a solution to these problems. Life and health are not attainable in that direction; they are a problem of the entire way of farming. It cannot be stated flatly that the condition of health, of soils and livestock is better in farms based on the peasant farmer's way of living. But it is true that the farmer who works with and not against the laws of nature makes a better showing with regard to the state of health in his soils and livestock.

The state of health in livestock is a result of farming methods, of breeding, of keeping, of feeding, and, through the latter, of the soil. The increase of plant diseases and pests is also in direct relationship to farming methods. The writer pointed out this relationship 25 years ago, and has to continue to do so. It can be brought into a simple formula: quantity times quality= constant. If farm methods tend to quantity production, the quality of the product is reduced. With the word quality, we mean that which relates to the state of health, and all qualitatively important properties. This is a universal law. A medicinal herb, for instance, contains a certain active principle. If this herb is growing (rich in medicinal value) in a wild state on poor or medium soil, and is then planted in rich soil with strong fertilizer, it will grow big and yield a greater quantity of total volume, but the yield of active ingredients (percentagewise) goes down.

The trend to growing more wheat per acre has produced a plant which contains less gluten and has lost some of its baking quality. "Time Magazine", of May 30, 1955, has just presented an illustration of this under the title "Agriculture — Plenty of Nothing". We are told that the U. S. has $2.6 billion tied up in its wheat-support program and the annual storage cost amounts to $150 million. Evidently a case of over-production. But there is at the same time a shortage of good wheat suitable for the baker.

"Of the U. S.'s billion bushel stock pile of wheat, farmers and bakers estimate that only 10% to 15% is usable in its present form by the breadmaking industry . . ." said Nebraska wheat farmer Herb Hughes, member of a five-man board that advises Agriculture Secretary Ezra Benson. Hughes described the breadmaking quality of the government stockpile as "fantastic and deplorable".

Less wheat and better quality is the answer. But the same authority — the Agriculture Department — only excites the farmer to growing more wheat. This is done not only through the support program but by way of its advice, research and agricultural teaching, stimulating the growing of more wheat — or, as to that, more of any product — per acre. Only quantity production is looked upon as a desirable aim.

The soil is the backbone of any plant growth. For many years now it has been shown that soils need organic matter more than anything else. But only fertilizers have been recommended, to increase the yield, and little has been done to increase quality

or prevent pests by biological means. The organic and biodynamic principle which has been proposed in this magazine and by others is still looked upon as something queer or out of the way.

"What we need more than anything else now is organic matter, even fertilizer won't help us any without organic matter. This is our most urgent problem", the *Referent for Fertilizer* in the German Ministry of Agriculture in Bonn said recently to this writer. But in his office there were still posters on the wall demonstrating the increase of quantity yield with fertilizers. No poster showed how the organic matter, as the basic requirement for quality production, can be increased. "You come at the right moment", it was said, "with your knowledge of the organic problem. We know but very little about it." "It is a pity that you didn't think so some 25 years ago when we first came out with the biodynamic method", was the answer. The biodynamic method which has proven that it can produce a quality wheat is still in the position of a Cinderella.

"If we could get only one farmer to set up and treat his manure piles properly", was the outcry of another Minister of the German Reich. Germany has learned it the hard way — in many respects. The soils there have not become better, as the evidence shows. Germany and the entire peasant farmer areas have one thing in common: diversified farming with a sufficient livestock and manure supply. The farmers there actually can give 10 tons per acre of manure to all root crops and heavily-demanding plants (beets, potatoes, corn), which is the required amount. Still the soils decline, because the humus management is neglected.

We found a professor, assistant chief of the Bayrische Landesanstalt fuer Pflanzenbau, Springer by name, who has developed excellent ideas with regard to stable and unstable humus. But we found very few who have ever listened to his message. His publications are relatively unknown and rarely quoted. His main idea is that manure only transforms into stable humus if not applied fresh, and if well rotted before using. Fresh manure wastes away within a short time and does not build up the necessary stable, lasting humus (here in America the Agriculture Department has for decades advised the farmer to plow under fresh manure).

On the soils of Upper Bavaria, with a gravel subsoil, it has become impossible to build up lasting humus. These soils waste

away, as most of our American soils do, even with manure and compost. It is necessary first to transform this manure into a form of humus which can sustain that kind of microlife which, in turn, produces and lives from a stable form of organic matter. Many of the organic enthusiasts, alas, also have not recognized and understood that there is a fundamental difference between broken down organic matter (crude compost or unstable humus) and the lasting form of completely digested and transformed, colloidal humus. Professor Springer's work bears out the fundamental difference between the two types. By just applying the crude broken-down matter commonly called compost, one does indeed feed the plants, or soil, with the mineral elements contained in the material, but the effects are only temporary. Here is the great error of the Richmond Engineering Experiment Station* when they would have people believe that a chance fermentation by such bacteria as may happen to be present is sufficient to transform garbage into humus. What one gets in this way is broken-down garbage but not stable humus. The Richmond Engineering Experimental Station uses the term "stabilization" of waste decay, meaning that instead of a foul odor and putrefaction, a kind of compost formation takes place. They maintain that no specific bacteria are necessary for composting.

The grave error in this thought is that no attention at all has been paid to the problem of stable and unstable humus, and no knowledge has been displayed with regard to the underlying problems in soils. The application of this error, and its subsequent consequences through the use of such compost along with the illusion that one would thereby be contributing to the building up of lasting fertility, would prove to be a fallacy that would only discredit the entire problem of composting. That is, it would disappoint the farmer in the long run.

The microlife in a stable, fertile soil is entirely different from that in an unstable soil. Neither crude compost nor inorganic fertilizer can build up a stable humus soil without that specific microlife. If it is not present, one should at least learn from nature how it can be done. Because, aside from the majority of unstable, agricultural soils, she has also built up some stable soils here and there. Prof. Springer's methods of analysis bear this out quite clearly.

The FOA, and other farm support programs, as we have seen them in Europe, do not support the farmer with regard to

*Reclamation of Municipal Refuse by Composting, Sanitary Engineering Research Project. Univ. of Calif. June 1953. Technical Bulletin F9, Series 37. Chapter III.

a humus building program, but only to the extent that he uses fertilizer and lime. It seems that the actual needs of the soils have evaded their recognition so far.

We saw — to close with something on the positive side — an experimental station of the Biodynamic Method, operated by Kurt W. Alman near Greisheim (Baden). Herr Alman, who has a great and genuine enthusiasm for a healthy, peasant type farming, demonstrates there numerous compost piles and composting methods. Various mixtures of raw materials are shown. All phases of stable and unstable humus could be seen by the visitors to this place. It was worth making a pilgrimage there, one of the highlights in the search for good composting practices. There is, furthermore, no reason why such piles could not be built by others, using mechanical equipment, in an economic way. All that is needed is to change the farmer's mental attitude, to get him to see that humus management is one of the most essential problems to be solved if there is to be a continuance of healthy farming and quality production. Until such time as this becomes general knowledge and practice, it remains for us only to play the role of a Cassandra, stating that the truth of our points of view is increasingly demonstrated by the decrease of soil fertility.

Peasant farming (as we have defined it earlier in this article) is more and more on the wane. It can only be revived by the mental attitude of the farmer, no matter where and under what circumstances he lives. It can only survive if the peasant farmer takes care of his soils on the basis of a living concept, not merely using a chemical equation in order to produce quantities of agricultural goods. The farmer is not alone at fault in the matter; it is the task of science and the economic system and the agencies of government to help alter his present attitude and bring about an organic concept of life. The survival of a really healthy agriculture is a task that concerns us all, farmers and those who live from the fruits of the land.

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## A CONSERVATION-ALERT COUNTY

BY MAYBEL M. HOLMES

"There is so much land in Allegany County that we have to pile it up," remarked farm agent Charles Hepplethwaite once, when someone complained that our area is very hilly. If you

look at the map of New York State and start counting from the western boundary, you will find that the third county east, bordering Pennsylvania, is this same high one, called Allegany.

So . . . our top soil and stones run off rapidly from the steep places, when inevitable floods result from heavy rains or melting snows. And the Allegany County Soil Conservation District, working with the farmers, is doing something about it. Along with such conservation practices as reforestation, contour plowing, strip-cropping and diversion ditches, many landowners make ponds.

In fact, as you drive about this very rural county, you keep discovering their blue-flashing surfaces tucked away here and there in the folds of the hills. If you ride far enough, long enough and round-about enough, you may even see all five hundred-odd of them. They average a half acre in size, a few, of course, really forming small artificial lakes, and were constructed at an average cost of about four hundred dollars.

In grandfather's time, older residents of the section will tell you, they had mill ponds and swimming holes in the streams which ran fairly full the year round. Then, gradually, these ponds and holes silted up, and only winding pebbly depressions indicated, during a spell of hot dry weather, where the water courses had been flowing.

Now-a-days the conservationists are working to restore the features of nature which grandfather enjoyed, except that they are smarter, and, with more know-how, are doing it better. They don't just dam a narrow part of the brook to let the water back up, and then have to build an expensive concrete spillway at the sides for the eventual overflow. Because the lake thus created finally clogs up again with silt and stones. Rather, they choose a clayey spot, preferably in a natural ravine, and if there are springs that will help, too. Incidentally, Allegany County has plenty of clay, which, in the bottom of a pond, prevents water seepage into the earth. They remove the top soil, scoop out enough clay to build a dyke, then put the soil back upon its top, when it is finished, so that vegetation can grow there. They can even arrange to have flood control features built into this dyke to prevent soil erosion below the pond. If it is made high enough, when there is too much flood to be taken care of by the overflow pipe which is led out under the dyke, the water can rise from one to three feet, in some instances holding back millions of gallons, without going over the top of the dyke.

Besides these surface, sky or dugout ponds, as they are called, there is also a by-pass type which lies adjacent to a stream bed. Part of this running water is diverted to the pond in such a manner that, during flood periods, the main course of the river takes away the excess water so that the pond neither silts up nor overflows.

Actually, enough water is not an agricultural problem in Allegany County. From 36 to 42 inches of rainfall occur each year. In fact, in only two places in New York State has the water table been dangerously lowered, even though uses for water have increased several-fold since grandfather's day. Not just ponds, but soil conservation measures in general, account for the maintenance of this water table.

People in Allegany County, after considering the erosion and loss of top soil going on all the time, and especially in the past, have marked out a long-range program of conservation that, in time, will return to their fields at a rate faster than they run off, the moisture and minerals so necessary to the raising of crops. Already some of the beneficial results of conservation ponds constructed in high places of the county are recognized. One is that the streams are tending to flow for longer periods, drying up less than formerly. Another is that deer and other animals which used to have to travel all the way to the bottom lands for water can now be accommodated up in the hills, nearer to their natural habitats, with consequent lessening of the destruction they used to visit on the gardens and fields through which their routes to the water level lay.

There are a number of interesting ways in which these Allegany County ponds are used. The first one is for water for the livestock on the farms. Second, they play an important role in fire protection, especially if they are near to farm buildings. Third, the water is used for spraying crops. Fourth, the ponds furnish recreation facilities to many people — camping picnicking, boating, fishing and swimming in summer and skating in winter. Fifth, those ponds which are far enough away from dwellings attract wild life. Irrigation is sixth on the list, but some water from the ponds is used in this way, too, during a particularly dry period. And lastly, these miniature silver lakes scattered over the countryside give added loveliness to the hilltop vistas of our already beautiful county.

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**Author's Note:**—Mr. Eddy E. Foster, head of the agricultural division of the State University Agricultural and Technical Institute at Alfred furnished the material for this article in a personal interview. Mr. Foster owns several lakes and ponds and is one of the foremost leaders in the conservation program of the county.

## CONTRASTING APPROACHES TO FARM PROBLEMS

PETER ESCHER

For a score of years I have been farming, studied farming and observed it and people engaged in farming. There appear to be two diametrically opposite camps in farming thought today. On the one hand the laissez faire idea advocated by Soil Conservation and many nature-lover societies. They want to give nature a chance to heal from at least some of the ravages wrought by the ignorance and carelessness of man. They have done a remarkable job in field, forest and stream and a lot of people enjoy the benefits of their toil when they go hiking, fishing and hunting. More people are interested in those "sports" than all the others combined. When Soil Conservation is applied to farm land, hedgerows are encouraged as fences, wind breaks and to protect wild life and give the birds a chance to nest; the birds in turn will feed on the grubs and beetles. Farm pools and water reservoirs have been encouraged and have helped many a farmer to irrigate and thus maintain his crop yield during a dry spell. The farming practices of the Soil Conservation advocates are by no means new. In a letter to Charles W. Peale, Jefferson writes: "We now plow horizontally following the curvatures of the hills and hollows on the dead level, however crooked the lines may be." It is to be noted that Jefferson's farms were in the hills and mountains, where it gets right warm in Summer and the slopes are exposed to the sun and winds. That is a place ideally located to foster all kinds of erosion. In a letter to Washington he writes: "Good Husbandry with us consists in abandoning corn and tobacco, tending small grain, some red clover following, and endeavoring to have, while the lands are at rest, a spontaneous cover of white clover."

He had a crop rotation and more important he left the land at rest. To leave a field fallow was practiced in the South as late as the nineteen-thirties. A field that didn't produce a good crop was left fallow during summer and the weeds plowed under in fall. The weeds give a very good indication of the state the field is in. As Jefferson says "endeavoring to have a spontaneous cover of white clover." As weeds are volunteers they indicate what kind of soil suits them. Look at an abandoned farm or an abandoned field. In the East generally a Sage grass will take over first, later on a white birch or cedar will start to grow indicating sour and shallow soils. If a soil is sour or not well

drained, over-irrigated, improperly tilled, the weeds will indicate it.

If clover volunteered it showed that the soil is in good shape. How many fields today would have clover as a weed if left fallow? At least they knew in those days what good farming was and what to look for. Today the scientific jargon and often certain commercial interests have gone a long way to distracting the attention from the essentials, and have often got lost in details. Fallowing nowadays would not be economically feasible in most parts of the East due to the high cost of land. It has been replaced by green manuring or plowing under of crops. There is one vacuum left by abandoning the practice of leaving a field fallow and that is filled by soil testing. With soil tests it is possible to know immediately what the deficiencies of a field are rather than to have to wait until the field has produced a crop of weeds. One of the originators of soil testing methods was asked: how do you check on your soil tests? He answered that they went to look at the field, if it grew a good crop of alfalfa. Soil tests made use of by many farmers remind me of bargain basements. The goods for sale downstairs are often out of date, and so are many of these soil tests that people get for "free". They like to save on a soil test, little realizing that an erroneous conclusion can be rather expensive. The advice given with the free soil tests is generally "Get some fertilizer".

Fertilizer has been the magic formula and general cure-all. It is suggested also that one apply lime. Well, if I go to a Doctor he prescribes an aspirin, later on I find out that he prescribes it for all his patients, then what good is he? This is quite a different kind of thought from the attitude of good practical farmers as shown by Jefferson's indication above. The conclusions often drawn from soil tests are to use a given quantity of fertilizer in order to achieve a given crop. Never mind what state of fertility the soil is in. In other words if a farmer has soil depleting crop rotation, he is advised to use more fertilizer; little attempt is made to advise him about his mistakes. The soil is the sufferer and becomes depleted. Probably more damage has been done with the misuse of mineral fertilizer, that is by applying too much than has been caused by a judicious use. Be that as it may the fact that the soils are becoming poorer is being taken for granted.

In the preface to a text book on commercial fertilizers is stated: "As there is an unbroken linkage between mineral de-

ficient soils, nutrient deficient crops and malnutrition of people, we find many educated city people today beginning to concern themselves with nutritive quality as well as quantity of food and price." And later on "the farmer's aim is no longer just to produce the maximum yields per acre but to produce the most profitable yields of quality feeds and food". The quality of food and feed has deteriorated, that seems to be an accepted fact, but what is done about it? In the book quoted, trace elements are mentioned; organic matter is still the orphan, is given about 1% of the space in the book.

The idea still appears to be, what can we do to increase and improve the *crops?* The *soil* is looked upon as *a medium in which to grow plants.* Biological Research has made some progress. The Chemurgic Digest for May, 1955 reports, "the leaf bettle, Chrysolina gemellata brought originally to California from Australia, has proved valuable for its special taste for Klamath weed. A survey in 1952-3 showed that nearly 400,000 acres of range in California once lightly to heavily infested with Klamath weed, have been brought under biological control with beetle aid. Plot counts have shown a recovery of this weed of less than one percent after 5 years of this type of control. The leaf beetles are being experimentally released in additional areas of infested northwest states."

What happens after the leaf beetle has polished off the Klamath weed, is another question. Will they die out after the Klamath weed has been eaten, or will they develop a strain that has acclimatized itself to the local conditions and that will eat other plants. It took some 20 years for the Japanese beetle to start its most virulent destruction. The same digest reports: "A new concept in insect control was tried and found effective when the screwworm fly — livestock pest in Florida and Texas and adjoining states — was eradicated from Curaçao in the West Indies. Success under the controlled conditions possible on an island offers encouragement to try the method in Florida. The female screwworm fly mates but once. Entomologists released thousands of laboratory-reared male flies, made sexually sterile by exposure to gamma rays from radioactive cobalt, from airplanes over Curaçao. Island authorities cooperated with the ARS scientists to make the experiment. Starting in March 1954 the entomologists released batches of the sterile male flies weekly. The following January they reported they had not trapped a single screwworm fly or obtained any eggs since November 4,

1954. Nor had anyone reported finding screwworms on livestock or other animals on the island."

The life of the screwworm is quite short, not so the half life of radioactive cobalt. That continues long after the screwworm male has died. What happens to the radioactive cobalt? Scientists state that these particles do no harm; that they have voluminous and conclusive proof for their case. These proofs of course simply state that the researchers have not found any damaging effects yet. The way to ask the question is, in what respect are those radioactive particles that we have released helpful to man, animal, plant, soil and atmosphere? These particles are — as their very name states — active. If it cannot be proven that they are helpful, then they have to be presumed destructive. In court the defendant is presumed innocent unless proven guilty. This kind of reasoning is being applied to introducing new methods in agriculture. It has brought us commercial fertilizer in the thirties, poisonous sprays in the forties, the use of radioactive particles in the fifties. What will the sixties bring?

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## A WEATHER HANDBOOK WORTH HAVING

A Book Review by Fred Heckel

"Our American Weather", by Dr. George H. T. Kimble, is a book of which it can safely be said that 90% of our readers will enjoy it. It is *completely scientific*: not abstract and theoretical but dealing with actual phenomena and their observation, and at the same time not glossing over or ignoring the observed facts for which the techniques of measuring, weighing and numbering offer no explanations. Furthermore, it makes for *most interesting reading.*

Published by the McGraw Hill Book Company, Inc., of New York, Toronto and London, and copyright, 1955, by Dr. Kimble, this book of 322 pages takes up the weather month by month from January through December. While the city dweller too should find it of genuine interest, everything is keyed to the situation and problems of the farmer and gardener as they arise throughout the course of the year. And though not all of them are new, its suggestions are presented in a practical, down-to-earth way.

Thus, opening the pages at random, one finds, under APRIL, a section headed "Fruit Trees and Frost". It begins:

"If you have a garden on a knoll 50 feet high, set in the middle of an open plain with no higher land nearby, it is extremely unlikely that any spring frost save one of phenomenal severity will spoil your fruit blossoms. Cold winds may prevent pollenizing by insects and gales may check tree growth, but frost will not trouble you unduly. This is because the small amount of cold air draining from your particular hillock will not be enough to raise the level of the frosty air on the plain below, a level which in the most severe spring frosts is unlikely to rise more than 10 feet above soil level. If, on the other hand, you have a garden in a saucerlike depression, then it is inviting trouble to plant fruit trees in it: even in Florida and California 'frost holes' have been the cause of many a citrus-grove failure, though frost there is a winter rather than a spring phenomenon.

"The important thing is the *relative* height of your site . . ."

Again, the JANUARY chapter, which among many other things goes into detail about "The ice storm", includes a listing of real value to the countryman or suburbanite who is thinking about setting out shade trees. Dr. Kimble lines up the species which (other things being equal) have the highest chances of surviving an ice storm, the lowest, and also the trees possessing fair resistance to ice damage.

The many "practical" bits scattered throughout the book include a table listing average dates for killing frosts in various parts of the country, the last in spring and the first in fall. Also there are many workable hints on how to forecast your own local weather — he points out that due to the lie and shape of the land, particular areas have their own weather, while regional forecasts must be generalized and do not necessarily reflect what is in store for any one spot.

He tells too, how to get the most out of the barometer, of which he says that "In the popular esteem it has long enjoyed a prognostic reputation equalled only by Nostradamus, the *Farmer's Almanac*, and the woolly bear caterpillar". Dr. Kimble adds that this reputation is "partly deserved, if for no other reason than that high-pressure systems are usually characterized by quite different types of weather from low-pressure systems . . . But the utility of the hall barometer to the ordinary householder is strictly limited — no matter how impressed he may be by the confidence of its maker that the weather will be 'settled fair' when the reading is high, 'stormy' when it is low, and 'unsettled' when it is midway between. It is probably safe to say that these

assurances have been responsible for more mistimed outdoor enterprise, including everything from haymaking to hill climbing, than all the backfiring forecasts of the U. S. Weather Bureau . . .

"Far more indicative than the actual pressure reading is the pressure *tendency*, that is, the amount the barometer has risen or fallen in a given period. This provides the observer with a measure of the development and displacement which the pressure system in his locality is undergoing, which in turn provides, especially if it is associated with changes in one or more of the other elements, a measure of the pace of atmospheric change. And pace of change is what matters most in appraising almost any weather situation . . ."

Dr. Kimble is definitely against "tinkering" with the weather by such means as silver iodide generators or other devices, and for two reasons.

"In the first place there is no guarantee that the changes induced by the tinkerers would do more good than harm. The conjuring up of a May shower might elate a cotton grower in California, but it could easily ruin the ripening strawberry crop of his neighbor. The neutralizing, at source, of a January cold wave might please the hotelkeeper in Palm Beach, but it could destroy the business of his confrere in Lake Placid."

The author's second objection to weathermaking devices is that there is no telling whether these inventions can be controlled, nor whether their effects can be correctly forecast. Thus, in cloud seeding, "it seems that the same operation is capable of stimulating nucleation of moisture particles one day and of inhibiting such nucleation the next. If you 'seed' only a modest amount of silver iodide or dry ice into a rain cloud, you can expect it to rain; if you seed it more generously, you can expect it to dissipate. The only trouble is that nobody so far knows how big a 'modest' amount has to become before it is 'generous'."

He goes on to show, in more detail than we have space to quote here, how the problems increase when it comes to some of the more elaborate schemes that have been proposed.

From his book, Dr. Kimble appears as a scientist in what one might call the "Goethean" sense of the word — an observer of phenomena who would let the facts speak rather than tell them how they should fit into neat theories. He refers, for instance, to the days of cold weather usually occurring around the middle of May, a cold snap known in Europe, where the

weather pattern in general differs from ours, as the days of the "Ice Saints" or "Ice Men". He points out that a similar "temperature relapse" in May occurs in this country at about the same time. His only comment in connection with the whole matter is the observation that while the succession of meteorological events throughout the year appears wild and disorderly it is at the same time possible to observe "a regard for seasons, a pattern — almost a rhythm — of behavior and a sense of timing that is nothing short of uncanny".

While there is literally nothing in the book which could bring the author into disrepute with the most dogmatic mechanist in the realm of natural science, the man himself, with a largeness of attitude that will not be limited to the sphere of measure, weight and number, appears every now and again. So, near the final pages, he devotes some time to "our habitually aggrieved attitude towards the weather", points out by way of specific examples the folly of such a point of view, and comments:

"Far from being either wasteful or wanton, I believe that the ordering of the meteorological realm, including the not infrequent semblances of disorder, is providential, and, so, a matter for reverence; and that what we cannot explain or find it in our hearts to commend, we should at least refrain from reviling."

The author's top-rank standing in the scientific field appears from the appended one-page biographical sketch that closes the book. Born and educated, and then teaching, in England, he served as a lieutenant commander engaged on invasion weather projects in the British Naval Meteorological Service. Later he went to Canada as chairman of the department of geography at McGill University and director of its meteorological observatory. He also established the now internationally known McGill Summer School of Geography. In 1950 he became director of the American Geographical Society of New York. Two years ago he resigned from that organization to direct the Survey of Tropical Africa, which is being sponsored by the Twentieth Century Fund.

One personal suggestion from the reviewer — while the book is well worth its cost of $4.75, try to get your local public library to buy it if this seems a little much for you. We ourselves ran into it on the 'new book' shelves in the exemplary little library here at Spring Valley or we'd probably never have had the pleasure (and painless education) of reading it. A book like this will be of value and pleasure to many.

## A NEW PUBLICATION

Our good friends The Rev. and Mrs. John H. Philbrick have launched another new project, a quarterly news letter about their work. We wish them all success, and, because we think our readers will enjoy, and profit from, it, we "lift" their front page for you. They will be glad to put you on their mailing list for it, if your write them.

NATIONAL TOWN AND COUNTRY CHURCH INSTITUTE

*ROANRIDGE HOMESTEAD* *NEWS LETTER*

ROUTE 3 Box 370 Parkville, Missouri

Number 1 Whitsuntide 1955

When someone asked the late Liberty Hyde Bailey, the Dean of American Agriculture what he would do for modern agriculture, he answered, "I would spiritualize it."

This NEWS SHEET will bring you quarterly news of projects and progress at the Roanridge Homestead as interpreted in their relation to the ministry. The homesteader is a clergyman living on one acre, and each project on the acre is geared in size and efficiency to fit into his schedule so that it takes no time or energy away from an effective ministry among his parishoners. Quite the contrary, his experiences in gardening, animal husbandry, bee-keeping and composting give him understanding and make him welcome among people concerned with Conservation all the way from the open country farmer to the suburban back yard gardener.

IF YOU WERE TO VISIT THE HOMESTEAD RIGHT NOW you would find Spring well advanced. The baby kids are weaned and run in the pasture with the older milk goats. Baby chicks of various ages get various kinds of feed. Bantam chicks, hatched by a hen are healthiest because the mother hen guides them to the food baby chicks should have to eat—weed seeds and insects!

The Bantams have a special place on the Homestead this summer. Their job is to eat grasshoppers which we already have by the hundreds. Normally other insects would eat the eggs and wet weather would weaken the remaining grasshoppers enough to keep them in control. But last year's hot weather and drought created a second year of ideal conditions for grasshoppers. The five Bantam roosters, two hens and ten chicks move from dawn till dark through the garden and orchard eating insects. They scratch a little, but not eough to hurt the gardens. We heard a sad story about a little boy whose four kittens died after eating

grasshoppers which had been poisoned by an insecticide. The Bantams may be a less efficient method of removing the grasshoppers, but at least they are effective and relatively harmless.

This year we are trying some new combinations of companion plants in the garden: lettuce and green beans and borage are all good for the strawberry patch. So far the strawberries have borne well. Two horseradish plants in the potato patch should make the potato plants healthy while green beans between the potatoes some years have helped keep down the potato bugs. This year however, the Colorado Potato Bug is very much with us. Onions with the cabbage and broccoli plants will keep away the cabbage butterfly. Stinging nettles and tomatoes and parsley have been planted in the asparagus bed. This year the elderberry bushes around the compost yard are flourishing and their effect on soil and compost is to make even the heavy clay soil soft and fluffy.

To make the Homestead front yard a model for a busy minister, we planted as many shrubs as possible with very simple beds to contain a few perennials and a very few annual flowers. One good day's work in spring is enough to get the beds in shape for the summer. Then we mulched heavily with straw (well threshed, so that it will not sow grain in the garden beds!) to keep the hot summer sun from baking the topsoil. Any weeds which now succeed in poking up through the mulch are puny and easy to pull up. The front gardens look neat, but they require a minimum of work, and practically no weeding. We have tried to keep labels on the herbs and on the weeds used for medicinal purposes for anyone who is interested in these plants.

Each homestead project takes as little time and attention as possible. It took about two hours to "go through" the beehives and put on supers to hold the honey flow which is at its height right now. The bees are getting water from duckpond and rainbarrel, visiting the flowers and helping to pollinate. Soon they will be swarming and there will be phone calls for "the minister to come and get this swarm of bees out of my pear tree."

While church meetings and parish work go on, the bees and the gardens go on producing, and the minister comes home to bring in the harvest.

## ONE MAN'S FARM

By David Clement

*Reprinted, by permission, from* Star and Furrow, *an English publication, Journal of the Bio-Dynamic Agricultural Association; Secretary's Office, Clent Cottage, Clent, Nr. Stourbridge, Worcs., England.*

It is natural, I suppose, to feel some hesitancy in writing about one's farming when still far from one's goal. But perhaps it will be of some interest and not too discouraging to others who think along similar lines, if I tell how I have gone about making this a Bio-dynamic farm, and the results I have so far attained.

In common, I believe, with many other people I experienced some disappointments when I started farming with Bio-dynamic methods. I did things, as I thought, "by the book," and the results were most disappointing. When Dr. Pfeiffer visited here I told him my experiences, and asked his advice. He pointed out what I already knew, but had not fully appreciated, that it was only by means of humus that these preparations worked, and that one must first get sufficient heart into the land. "The more the soil improves, the more our preparations work," he said.

I therefore set about increasing the humus of the fields and began on an eight year rotation.

3 years grass ley in which is a good proportion of white clover.
1 year Wheat.
1 year Red Clover and Rye grass for hay.
1 year Roots. (Potatoes, Sugar Beet, Mangolds, etc.).
2 years Spring Corn*. (Oats, Wheat, Barley, Beans and Peas, of which about one third is beans and peas.)

*American readers will recall that the English use the word "corn" as we would "grains".

It will be seen from this that there is a proportion of leguminous crops in six years out of eight.

For dunging the land I used to cart it out from the yards, heap it in the field in which it would be used and prepare it there. Again at Dr. Pfeiffer's suggestion I started to prepare the manure while still in the yard, as it is most important that the preparations are inserted at the commencement of the rotting process, and not when it is already half rotten. I have lately bought a mechanical manure spreader, and finding this very efficient, and able to spread perfectly evenly as little as four tons to the acre, or as much as eighteen or twenty tons, I thought I would probably be wiser to apply the manure little and often

rather than in one big dressing for the root break. I felt that the manure would be more easily assimilated by the soil, and that in all probability it would more quickly build up fertility. I have therefore dressed the leys in their last year with about five tons to the acre, and the root ground with about fifteen tons.

The soil is Keuper sandstone, a light red gritty sand, which goes to a considerable depth. It is land which quickly responds to good treatment, but is also very quickly impoverished. This rotation and treatment have brought about a considerable improvement in the texture and colour of the soil, but interestingly enough the analysis is still very poor. I had tests made of most of the fields in February 1953, and following the experiments of the Soil Association asked the Advisory Service to repeat the tests at the end of May in the growing season, the time of maximum availability. They did not come, however, until late in August, and the results were much the same as before. Nevertheless our yields have been quite good. In 1953 our mixed corn averaged thirty hundredweight to the acre; sugar beet fourteen tons of washed beet; potatoes ten tons of ware. In the 1954 season our beet has not been nearly as good, but our potatoes are slightly better; not having finished thrashing, I cannot say how the mixed corn will turn out, but it is of very good quality.

I have never been able to grow a big crop of wheat, but this is really not wheat ground. I have not grown much over a ton to the acre. This harvest, although we began very late, we finished within a month, and had very little spoilt. I put this down to the fact that our corn ripened more evenly than most people's. In that month we harvested over eighty acres, and were considerably better off than the average farm in this district. We were able to drill thirty-six acres of winter corn in November, and I know of no one else in this district who was able to drill after September. Others besides myself were surprised to see how much rain a field of good humus content can absorb, and how soon afterwards drilling can begin.

One of the first questions is how much stock, and of what kinds, are necessary to provide sufficient manure for the farm. This is of course never static, but is always changing according to the circumstances. At the present time I have a herd of between eighty and ninety dual purpose Dairy Shorthorns, a flock of sixty ewes, between twenty and thirty pigs, some five hundred head of poultry — three hundred being layers, and two hundred growing cockerels. The yarded cattle, pigs and poultry

produce about five hundred tons of manure a year. Although there is no difficulty in preparing the manure, I have not yet succeeded in spraying many fields. The farm is about two hundred and fifty acres, of which two hundred and twenty are arable. It carries a labour force of six men, a boy and a girl.

Our herd average is about eight hundred gallons. Our yarded hens, without electric light to lengthen the winter days, last year averaged one hundred and ninety eggs each. Our bull calves we steer and if possible feed them out, and failing that sell them as stores. Of our concentrate foods about one-third, i.e., twenty-four tons, are purchased yearly; about fifty tons are homegrown.

There is nothing very remarkable in any of these figures, and I am very conscious that my farm is not yet fully Bio-dynamic. I still buy a certain amount of fish manure to augment my dung for my potatoes and beet, and for the second year corn. But nevertheless I have gone far enough to see the great value and possibilities of these methods, and in times of exceptional weather our results have called up comment from outside.

It has taken me many years to find the best proportion of the different crops to grow, and the different kinds of stock to keep, and I am still evolving these. It is largely a question of how to reconcile the best farming practices with the economic demands, and today these latter press very hard upon most farmers. I find, good as my rotation has been for the soil, it is necessary for economic reasons that I increase my cash crops. As you will see above, they have been only wheat and one break of potatoes and sugar beet. I am therefore starting this year to lengthen the rotation to four years grass and six years arable, of which two of the latter will be roots, i.e., one year potatoes and one year sugar beet and mangolds. I will still keep my proportion of half the land down to grass and clover in order to keep up the fertility, but it will mean a reduction in my corn acreage.

Farms vary a great deal, and on each the problems have to be tackled in a somewhat different way. The above is a brief account of the way I have been going about it. It depends mainly on two things, the man and the possibilities of the farm. One man can make a success where another cannot. Nowhere is this seen more clearly than in farming. On coming newly to a farm, or on wishing to turn a farm over to the Bio-dynamic methods, I believe the first and most important thing to do is to assess the potentiality of the place, and picture the ideal of what it should become. Experience and years, of course, alter the pic-

ture more or less according to how well one has assessed the position at the beginning. One should aim at as wide a variety of products as the farm lends itself to. This is wise from all points of view — health, labour and economics. It is as well to start one's purely Bio-dynamic work, i.e., use of preparations, etc., on a small scale at first, perhaps only in the garden, in order to get one's own experiences. For these methods depend far more on personal experience than on written instructions. As the fertility of the farm is built up, so the methods can be incorporated more and more.

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## GREENHOUSE EXPERIENCES

HELEN PHILBRICK

Like all amateurs, when we filled the greenhouse the first fall we kept adding more plants until the house was overflowing. That was three years ago. This year we were firm. Those irresistible plants must live in pots upstairs unless they could be proved indispensable for the greenhouse. Even with all our vigilance there were twelve kinds of plants in an eight foot square house last winter. In January they were growing comfortably together, but as soon as the climbing sun in February encouraged them to expand, they began to crowd each other.

During the winter of 1954-55 the greenhouse was devoted to lettuce principally, for the following reasons: 1) This is a plant we use frequently, 2) There are many varieties of lettuce well adapted for growing in the cool greenhouse. 3) This is a large item of the food budget which can thus be raised at home, saving expense and making sure it is raised with adequate soil treatment. 4) Rows of lettuces alternating light and dark leaves are as attractive — and much more dependable — than any blooms we have been able to raise, and they last much longer in the cool house.

Plants which grew well together included Black Seeded Simpson lettuce, Bibb Lettuce, Broad leaved Batavian escarole, Scarlet Globe Radish, Chamomile (4 plants) and one plant each of chrysanthemum, sage, chives, pansy, ivy geranium and Hamburg rooted Parsley. There is a violet plant which dies down in the fall but which seeds itself and grows again in the spring.

Technically the cool green house varies in temperature from 54° to 50° F. average. It may go to 35° F. or even to 30° F. at

night. In the middle of the day in bright sunshine the temperature of the air may go as high as 80° F. in the winter and 100° F. in spring before the glass is painted to shade it. But in general a cool even temperature is maintained not so much by heating as by not heating the house. Some books tell of letting the sun shine on the house in the daytime to build up the heat and covering the house in the early evening to conserve the heat thus absorbed by the soil. We believe that unless one is on hand regularly every day to cover the house, it is better to have some kind of steady automatic heat which does not depend on a person's schedule. The heat that flows up into the greenhouse from our furnace is imperceptible, but it is as dependable as the furnace that heats the main house.

A moderate to Warm Greenhouse averages 55° F. to 70° F. and requires some kind of artificial heat. Chabot's book, GREENHOUSE GARDENING FOR EVERYONE contains alphabetical lists of the flowers adapted for both kinds of greenhouses. We followed the recommendations for the cool house conscientiously several years but found we were using much labor rearranging pots of sweet alyssum, larkspur, salpiglossis and candytuft to best advantage. A few flowers among the vegetables add color and beauty and in the case of some plants growing directly in the benches, they have a symbiotic effect on the neighboring plants. Our worst mistake was the amateur's temptation to try every plant in the list at the same time. The result was, anemones too crowded to bloom evenly, tulips which blighted because we could not time their stay in the cold cellar and oxalis which collapsed because of one day's neglect when the sun came out too hot and shriveled the plant. The primroses, imported as plants from a seed house, were infested with red spider mites which got ahead of us before we detected them. The larkspur seedlings brought in from the garden grew enormous and had to be repotted often, finally blooming at the same time as their relatives out in the garden.

One completely satisfactory flower was a single nasturtium which finally grew so large it overflowed the bench and hung over the wall in golden profusion, blooming until late in June. Another good flower for the cool house is the sweet pea if there is enough head space for the plants to climb. We have too little space but even so the vines climb over themselves and on the two feet of northwest wall which gets early morning sunshine and afternoon shade we can grow about six plants which bloom in

May and June. Sweet peas across the aisle on the southwest wall get so much more sunshine that they grow leggy and the blossoms are blighted. Theoretically the pansy plant should have been a success in the cool house, placed on the shady side, but the theory failed to consider the sow bugs who would rather eat pansy plants than anything else. In spite of continual nibbling, however, the plant kept alive. Some year when there are fewer sow bugs we will try pansies again.

Every year we have tried to grow freesia although it requires slightly higher temperatures than we can get in the cool house. We shifted the pots from high to low to get the most sunshine and the best temperature. This year we planted the bulbs directly in the bench near the inside wall and we got fine sturdy blooms for several weeks in late March and April. It is interesting to note that freesia generally blooms in February, but this house was not warm enough to bring it into bloom until the sunshine was stronger and the winter's cold was beginning to moderate. The freesia blooms were thoroughly enjoyable this year and the perfume was delicious. The minute the cellar door was opened, the sweet scent was wafted over our whole house.

In addition to freesia one of the seed houses recommended, in answer to our inquiry, ixia and babiana which sounded charming and simple to raise (we were reading directions for only one plant at a time). When we ordered them, the seed house had no bulbs but only seeds. They assured us that it was simple to grow the seeds and save the little bulbs each season until they grew large enough to bloom. The result was that we spent considerable money and a great deal of time studying up on plants which were too complicated for our simple needs. Probably every amateur has to learn by his own experience that what seems simple when you read it in a catalogue may be extremely difficult when translated in terms of seeds and pots and markers and record books and storage spaces for many little nondescript bulbs. Not to mention the complications of finding those bulbs and replanting them at the right time the following year.

It is therefore small wonder that we have enjoyed this season's single crop of lettuce, although the seeds of thyme, marjoram, and parsley are already sprouting in the seed flat to replace the lettuce as soon as it is used. Last year we found that a large "patch" of moss curled parsley would grow profusely and provide plenty of parsley to everyone in the neighborhood with enough left over to freeze.

The parsley grew where it had seeded itself from a plant allowed to go to seed in August 1953. Parsley seed need heat to germinate, as we proved in January by soaking it in hot water and planting it over bottom heat which made it sprout in nine days. One European herbal recommended sprinkling quicklime over sown parsley seed to provide the needed heat.

A celeriac plant brought in from the garden in the fall flourished and provided flavoring for soups and salads all fall and winter. Thyme, marjoram and sage wintered over in the greenhouse and provided herbs for many a soup and salad all winter and spring. However, with the exception of the sage, the other herbs died in the early summer when the excessive heat in the greenhouse was too much for them. Perennials will not survive the summer if they are forced all winter.

Each year our record book has become more simplified although we have tried to jot down anything that seems relevant. Planting dates, varieties and any special treatment — spraying with BD Sprays 500 or 501 — should be carefully noted. We have been especially careful to record the temperatures in order to know how long we have used the electric steam radiator, to compute the cost of maintenance of the greenhouse in winter.

Last year we decided to record the temperatures with colored pencils. The record sheets were tacked to the house wall at the west end of the greenhouse with red and blue pencils on a convenient shelf. Calendar and almanac completed the reference equipment. No one ever told us that red pencil fades when exposed to sunlight. After a week or two there was not a trace of anything that had been recorded in red pencil. We tell this in the hope that it may prevent some one else's records fading away.

Keeping accurate records helps one to plan from year to year. One of the hardest elements in homesteading for the amateur is to plan ahead far enough to have things ready when they are needed. By combing many books on greenhouse and garden requirements we have compiled a list of seeds or bulbs to be planted each month. A card file organized by months contains all these seasonal suggestions. The latter part of each month we can refer to the file for the next month's jobs to be sure all supplies are on hand and the necessary preparations are made. However good such a system may be it is useless unless it is translated into the experience of actually doing the job. Many of us who have grown up with book-learning for our education

tend to feel that if we have knowledge in a book or in a card file, it is sufficient. Actually this kind of knowledge has to be translated into first-hand experience of mind and muscle and nose and sight before we have it at all.

One of the happiest aspects of growing things in a greenhouse is the opportunity for concentrated observation of what is going on between the plants, the soil, the insects, the atmosphere, and of course the sun and the moon. No detail can be too small. For instance, a slight movement in one corner this morning revealed a hole in the soil. Intense watching and patient waiting finally revealed a Lycosa spider lurking in the hole. As the sun came from behind a cloud, the spider slowly came up from the hole to sun her back. While we were silently watching the spider, two crickets poked their antennae from their hiding places and waved them about. They were too torpid with the cool weather or too suspicious of the intruder to come out, however. A smaller spider, as yet unidentified came out and went to work on her web in the sunshine. The best feature about our greenhouse is that the aisle is so deep that one can stand with the benches on eye level, an ideal position for studying everything with a magnifying glass.

A regular feature of our greenhouse care is the nightly trip downstairs with a flashlight to see what goes on at night that differs from daytime activity. (Try it in your garden some summer night and see how numerous and various the night-flying insects are: more than you ever suspected!) During some seasons the earthworms come up at night and leave their castings on the surface of the benches. While it is very cold they do not come up. This past winter we had a large population of sow bugs (also called wood lice or millepedes) probably encouraged by the drought of the past two years. There is not a sign of a sow bug all day. But the night visit has revealed dozens of them eating various plants with a definite order of preference. They go first for the hedge balls (Osage Oranges) which we bring in from the hedges to keep the sow bugs away from other plants. The pansy plant is a close second and is sure to harbor half a dozen of the clumsy creatures eating away the tender leaves at the top of the plant. As the radishes expanded and rose above the surface of the soil, the sow bugs nibbled the red rind a little each night. The result was a series of white spots encircling each radish, the ones at the top healing over as the plant developed. The encyclopedia states that the mouth parts of this vari-

ety of millipede are rather inadequate so they require very tender vegetation. We have tried to observe by flashlight and magnifying glass, but the process of eating has none of the devouring that a caterpillar, for instance, exhibits. At least we know what ate our radishes.

Later in the season when we planted cabbage and broccoli seeds, the sow bugs became a real problem. One of our neighbors called them "wet day bugs" and told us to sprinkle lime on the places they frequented. This we did, but the lime did not keep the "bugs" away. Every night they would eat the tender leaves of the sprouting seeds. Finally we realized that if no sow bugs are in evidence in the daytime, perhaps the light would keep them away. Every night after that the greenhouse was brilliantly lighted by one 100 Watt bulb, and we had no more damage from the sow bugs. Incidentally, the lime was not good for the cabbage seedlings, as we suspected in the beginning.

There have been other pests which needed local control. Plants like the primrose which are rather likely to have red spider are easier to treat if they are in pots and can be removed for spraying with pyrethrum or rotenone. We prefer not to spray poisons of any kind in the greenhouse because of the danger of killing the spiders and the beneficial insects. Here again, for the amateur it is an advantage to have a limited number of plants of known resistance to disease and insects. The cool temperature also helps keep the insects under control. Late in the spring we have a few aphids, but the lady bugs come and go through the open windows. If the grasshoppers are as bad this season as they were in 1954, we will screen the greenhouse windows to provide a refuge for some plants we would rather not lose altogether as we did in 1954 when the hoppers were unusually hungry.

Another problem which interfered with operations until we learned some solutions was difficulty in getting seeds to germinate. The cool greenhouse, except in summer when it is too hot, is much too cool for germination. We read about providing "bottom heat" for seeds, tried it, and found that it works if the moisture of the atmosphere can be controlled. One of our troubles was that we tried to sow the seeds in our usual topsoil which appears to contain so much clay that the seeds cannot sprout. Using pure sand failed also because it dried out too much over the hot air registers which we have to use for bottom heat. Now we use a flat with a layer of soil covered with a layer

of sand in which the seed is sown. None of the soil is sterilized. Rainwater provides the moisture and the whole flat is covered with several layers of cheesecloth where the water may be trickled on without washing out the seeds. In spring when we have to start several kinds of seeds to be transplanted in the vegetable and flower garden, we sow seeds of each plant in 3 inch plant bands with a small drinking glass on each to maintain the moisture. With this arrangement a plant which needs a cool growing climate like broccoli may be taken down to the cool greenhouse as soon as it has germinated. Others which need more warmth like thyme and portulaca may be kept upstairs to grow rapidly in a warmer temperature. Whenever possible we try to use BD Spray 500 in seed flats and when transplanting. It is important to keep good records on the use of spray 500 because BD Spray 501 should be used only where 500 has already been used.

We sprinkled the greenhouse soil with 500 when the soil was brought in in the fall. Therefore we should be able to use 501 when the dark rays of winter do not bring much light to the plants. Valerian also helps the plants develop when the light is lacking. Our spray program for 1954 included 501, valerian and equisetum alternating, sprayed once a week. According to the records, however, we sprayed consistently every week through January and about half of February. By then the growth forces took over and the plants flourished and grew so fast that we could hardly keep up with them.

*To Be Concluded*

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